Thomas (T. G.)

THE INTRA-VENOUS INJECTION OF MILK AS A SUBSTITUTE FOR THE TRANSFUSION OF BLOOD.

ILLUSTRATED BY SEVEN OPERATIONS.

BY

T. GAILLARD THOMAS, M. D.,

NEW YORK.

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The possibility of saving life by the introduction of healthy blood into the circulation of one suffering from sudden loss or gradual depreciation of the vital fluid, naturally presented itself as a resource to the minds of physicians of the earliest periods. Hebraic, Egyptian, and Syriac medical records all tell of the practice of this procedure in the various ages of which they speak; and steadily downward through the times of Greece and of Rome can traces, well marked and distinct, be discovered of its occasional adoption as a therapeutical resource. Nor was the operation lost sight of in the advance of modern times, for, in 1492, we learn that one of the Roman pontiffs was submitted to it at the hands of a Jewish physician; that in 1615 an essay was written upon the subject by Libavius, of Halle; that in 1652 Folli, of Italy, contrived an apparatus for arterio-venous transfusion, and that in 1664 the process was fully described by Daniel, of Leipsic, as one to which he was in the habit of resorting.

But it was not until 1665 that the transfusion of blood

was put upon a scientific basis as a surgical procedure. At that time Lower and Boyle, of England, brought the subject before the Royal Society of London. Since that period, it has been a recognized resource; and, with varying frequency and equally varying results, it has been practised up to our day.

Toward the end of the eighteenth century, a great degree of apathy was exhibited in reference to this operation, but this was, in 1818, rapidly dispelled by the brilliant results of an eminent obstetrician, whose death has occurred only within the past three months—Dr. Blundell, of London.

It is neither necessary nor appropriate for me in this connection to follow out the history of the subject farther than this. In leaving it with this very desultory sketch, I must draw attention to the labors of Roussel, of Geneva, who has labored conscientiously, intelligently, and most successfully in this field. His *brochure* upon it, introduced to English-speaking physicians by Dr. Paget, of London, constitutes a succinct and complete handbook, to which all may with profit refer.

Despite the intelligent and energetic efforts which have been made in behalf of transfusion of blood during more than two hundred years under the fostering influences of modern science, what is its real status as a resource in medicine to-day? Putting aside the sanguine expectations of enthusiasts and partisans, what is its just estimate at the hands of the profession in our time? Whether my reply to this question will meet the indorsement of my colleagues I do not know, but it is this: transfusion of blood into the human system holds the position of an operation the plausibility and theoretical advantages of which all admit, but the absolute utility and practical results of which amount to very little indeed. If proof of the correctness of this reply were demanded, I would point to the infrequency of its adoption in a large metropolis like this, to the fact that many of our boldest and most skillful surgeons have never performed it, and that cases demanding it, according to the dicta of its upholders, are dying among us constantly without receiving the benefits which are claimed for it.

Nothing is farther from my desire than to depreciate the claims of a procedure which I sincerely hope to see ere long become much more frequently employed than it has been in the past. My only wish is to state the facts exactly as they exist, and I believe that I have done so in the preceding sentences.

The reason for the unfortunate fact that the transfusion of blood is rarely resorted to, and that it to only a very limited degree enjoys the confidence of the profession, is to be found, I think, in the inherent difficulties and dangers of the operation, almost all of which arise from the tendency to coagulation which characterizes the fluid which is employed. A pellet of lymph or a limited quantity of atmospheric air entering the circulation, or, as Roussel[1] declares, the mere contamination of the blood by contact with air, is enough to invalidate the operation and turn the scales against success.

Could another vital, animal fluid be discovered which would fulfill the indications of increasing the amount and improving the quality of the blood, and which did not possess the disadvantages above mentioned, a great gain would be accomplished, and a procedure now little practised might perchance become much more popular, and produce results much more prolific in good.

The object of this paper is to prove that in the milk of the cow, probably also in that of other mammalians, we possess such a fluid, and it will be given up chiefly to the presentation of cases in which the experiment has been tried upon the human being.

When the proposition of injecting milk directly into the venous blood as it goes toward the heart is first made, it is likely to excite violent prejudice and opposition in the mind of the hearer. The fluid, it is usually declared, is not homogeneous with the blood; the casein will cause obstructions in small arteries; and the emunctories, in endeavoring to eliminate it, will become overwhelmed by congestion. But is there really much more apparent want of homogeneity between milk and blood than between chyle and blood? The latter collected in the receptaculum chyli passes up the thoracic duct, and, as

[1] *Op. cit.*, page 8.

an oily, white, milky-looking fluid, is emptied directly into the left subclavian vein. The chyle now mingles with the blood, where, between the venous extremity of the thoracic duct and the right heart, it can readily be traced in oil globules and granules. While passing through the lungs these disappear, but in what manner is not certainly known. But not only is the blood supplied with fat by the thoracic duct; the portal vein likewise absorbs it from the lining membrane of the intestines, and, passing it through the liver, empties it into the general circulation. This double supply is too much for the lungs to dispose of, and the fatty elements which form the basis of chyle accumulate in appreciable quantities throughout the blood.

Some years ago a practitioner, of very large experience in this city, brought before the Academy of Medicine a quantity of blood, which presented, he thought, a most extraordinary and unheard of phenomenon. This blood, about sixteen ounces in amount, had been drawn by him on the previous day from the arm of a gentleman who had fallen from his seat at the dinner table, after a hearty meal, in an attack of apoplexy. Without special design the doctor had left the blood standing in a glass vessel in his office, when after some hours he had discovered, toward the top of the vessel, a distinct and voluminous zone of white, milky-looking fluid, a fluid which had evidently been previously mixed with the blood, and was now separated from it. To this remarkable phenomenon the attention of the Academy was called. Prof. Dalton, who was present, stated in explanation the well-known physiological fact that, for some hours after digestion, the blood, if the food taken has been rich, is always loaded with a superabundance of oleaginous material, and that if drawn will often present the appearance known as that of "chylous" or "milky" blood. In the dog, physiologists produce this condition at will, to demonstrate the fact which I have stated.

This is the fluid which Nature mixes with the blood at short intervals all through man's life; this the fluid which the blood utilizes for its own multiplication and nutrition, rapidly manufacturing from the milky, oily, homogeneous mass the red liquid upon which the tissues live. This fluid is not very

unlike milk, and in injecting milk into the veins we are imitating Nature very closely in one of her most simple physiological processes. Let us compare the chemical constituency of chyle and milk:

Chyle consists of	Milk consists of
Fluid plasma,	Water,
Leucocytes,	Casein,
Fat globules.	Butter,
	Sugar,
	Soda,
	Chlorides of sodium and potassium,
	Phosphates of soda, potash,
	Magnesia, lime, and iron, and alkaline carbonates.

Chyle is fat in emulsion in a serous fluid. Milk is fat molecularly divided and suspended in water with casein and sugar. The salts are so small in amount that in 1,000 parts they represent only 6.

Upon this fact I do not propose to rest to any extent for the support of my views in reference to the substitution of milk for blood in transfusion. I shall offer much stronger ones. My wish is only, before proceeding further, to silence prejudice by pointing out the fact that, while chemically inferior to blood, which is identical with the fluid to be augmented and improved, milk is more allied to chyle, the material of which Nature makes blood, than any other fluid with which we are acquainted.

I shall now bring forward the details of the subject in connection with cases which illustrate it.

On the 9th of October, 1875, Mrs. S., of Oswego, N. Y., temporarily residing in Brooklyn, aged thirty years, the mother of two children, called upon me by the advice of Dr. Chauncey L. Mitchell, of the latter city, and gave me the following history of her case.

Seventeen months ago, up to which time she had been in good health, she had been safely delivered of a child. Since that time she had been slowly but steadily failing in strength, becoming more and more feeble, and within the last six months rapidly emaciating. No cause could be found for this constitutional depreciation until last May, when Dr. C. C. P. Clark, of Oswego, upon making a careful vaginal examination,

discovered a solid tumor connected with one ovary, not larger than an egg. Since that time this tumor had gone on steadily increasing in size until, at the time of her examination by me, it was as large as the uterus at the sixth and a half or seventh month of pregnancy.

Besides the marked constitutional depreciation and emaciation which had developed during the past six months, no other decided symptoms had shown themselves. The menstrual discharge had been absent for three months, and some neuralgic pains had existed about the inguinal regions and lower part of the abdomen. When asked what her chief suffering was, the patient would reply that she suffered no absolute pain, but that she felt generally wretched and exceedingly feeble.

Physical examination yielded the following results: the uterus held its normal position as to elevation in the pelvis, but was pushed forward toward the symphysis pubis by a round, hard immovable tumor, which occupied Douglas's pouch and filled the upper part of the sacral concavity. The uterus measured, from os externum to fundus, three inches; and upon rotation of the uterine sound it could be distinctly, though not freely, moved without impressing the movement upon the tumor which lay behind it. Upon conjoined manipulation the large, hard tumor mentioned as occupying the abdominal cavity could be felt. It extended above the umbilicus for about three inches, and filled the false pelvis from one iliac crest to the other. Its surface was flat and smooth, the tips of the fingers could be inserted under its edge, and the tumor could be easily moved in every direction, though only to a limited degree.

I was somewhat puzzled at finding that movements impressed upon the abdominal tumor did not proportionately influence that portion felt behind the uterus. This fact was fully explained upon opening the abdominal cavity at a later period. The uterus moved with the abdominal tumor, but not so freely as it would have done had this been attached to it by sessile attachment or even by a very short pedicle.

Owing to the enfeebled state of the patient, the physical examination was not made so thoroughly as it might have been, and was concluded as rapidly as was consistent with clearness of diagnosis.

As the patient was already greatly enfeebled, and was steadily becoming more and more exhausted, I readily assented to her own desire and that of her friends, and agreed to perform ovariotomy without much delay.

On the 14th of October, at 3½ o'clock P. M., I proceeded to

operate in the presence of Dr. C. C. P. Clark, of Oswego, Drs. Mitchell and Skene, of Brooklyn, and Drs. Hunter, Walker, and Jones, of New York. The patient having been etherized by Dr. Skene, and placed upon her back upon a table, I made an incision through the peritoneum, extending from a point two inches above the umbilicus to the symphysis pubis. Through this the tumor, which was unattached, was removed. The pedicle, consisting of the right ovarian ligament, Fallopian tube, and extension of the round ligament, was secured in a clamp, but upon subsequent examination it was found to be so tense that I ligated and returned it to the pelvis.

Upon examining the uterus it was found to be perfectly normal, but the left ovary was as large as a bullock's kidney, and lay behind the uterus, distending and occupying Douglas's pouch. This was removed like the right, and the abdominal incision rapidly closed.

The whole operation occupied 36 minutes. At its conclusion the patient was removed to a warm bed, hot bricks put to her feet, the room darkened, and perfect quiet enjoined.

The patient was left under the care of Dr. S. B. Jones, who, on account of her very enfeebled condition, remained with her constantly for the next five days, and to his watchfulness and care I cannot but feel that the subsequent recovery of the patient was in great part due.

She was kept entirely upon the milk diet, taking this in very small amounts, and at intervals of three or four hours, and was quieted by small doses of morphia.

During the next 36 hours all went well, the temperature did not rise above 102°, and the only anxiety which was felt in reference to her during this period was created by the fact that she could take very little food without vomiting, and that her pulse, the rate of which was 130 to the minute, was exceedingly small, feeble, and flickering. On Friday, the 15th, I saw her in consultation with Drs. Mitchell and Jones. On Saturday morning, just 36 hours after the operation, I received a telegram stating that a rather profuse uterine hæmorrhage had come on, and that the patient had lost ground decidedly in consequence. At 10 that morning I saw her, and the condition of affairs looked decidedly unpromising. The pulse was so rapid and weak that at times it could scarcely be felt, and the patient began to vomit everything that was put into the stomach, even small pellets of ice. The foot of the bedstead was elevated twelve inches, cold was applied to the vulva, and the patient kept perfectly quiet. From this time nourishment was given by the rectum alone.

On the evening of that day I was forced to go to Rhinebeck, whence I could not return before the evening of the following day. At 11 o'clock that night I received a telegram from Dr. Jones, stating that the uterine hæmorrhage had recurred so violently that, with the assent of Dr. Mitchell, he had used a vaginal tampon, and that the patient was sinking so rapidly that she would die before morning. Reaching home late on Sunday night, I found that death had not occurred, and early on Monday morning I went to Brooklyn to see her.

On this visit I found everything looking very badly. Both stomach and rectum rejected all nourishment; the temperature was only 102°, but the pulse was small, flickering, and beating at 140 to the minute. It was agreed that very small amounts of fluid food should be cautiously tried by stomach and rectum, and, as the patient appeared to be dying from sheer exhaustion, the result of previous enfeeblement by the disease and more recent starvation and loss of blood, that, in case Drs. Mitchell and Jones should toward night feel convinced that death would occur, I should be summoned to perform transfusion.

At 6 that evening (Monday, four days after operation) I received a telegram urging my immediate attendance on Mrs. S., who appeared to be rapidly sinking. When I saw her I found her bathed in cold sweat, with a temperature of 101°, a pulse of 150, and a facies expressive of approaching dissolution. It was decided at once to try the effect of transfusion.

Three experiments with the transfusion of blood rendered me very averse to the employment of this fluid, and with the consent of my colleagues I decided to employ instead perfectly pure, fresh milk. This idea suggested itself to my mind from the recollection of some cases in which it was employed 28 years ago by Dr. Edward M. Hodder, of Toronto, Canada. In 1850 Dr. Hodder injected this fluid into the veins of three patients moribund from Asiatic cholera, which was at that time epidemic in Canada. In a communication from him he informs me that he injected as much as 14 ounces at one sitting; that no alarming symptoms occurred; that good results manifested themselves from the first; and that two recoveries had taken place in patients who appeared moribund when the operation was resorted to. He was encouraged to try the method from the fact that Donné had injected milk into the veins of dogs and rabbits without injury to them. Since the

cases reported by Dr. Hodder, I knew of no one who had repeated this experiment in the human being until a year before this time, when Dr. Joseph W. Howe, of this city, injected six ounces of warm goat's milk into the cephalic vein of a patient suffering from tubercular disease, and who appeared to be dying from starvation in consequence of an inability to retain nutritious material by either stomach or rectum. Dr. Howe declares that—

"When nearly two ounces had been thrown into the circulation, he complained of pain in the head and vertigo. The eyes twitched from side to side (*nystgmus*), and he said he could not see. The same symptoms recurred when the next ounce was thrown in, and ceased when the injection was suspended. The third repetition of the same quantity produced pain in the chest and dyspnœa, and no brain symptoms. His pulse seemed to be fuller after the operation, and he said he felt better. Death took place four days afterward. A *post-mortem* examination showed that there were no clots in the veins of the arm or in the lungs. The brain was normal. I don't think the operation improved his condition, notwithstanding the fact that the patient himself and the house surgeon thought it did."

Having decided to inject milk into the veins of my patient, a young and healthy cow was driven into the yard, a pitcher with gauze tied over its top was placed in a bucket of warm water, the vein was exposed, and the cow milked at the moment the fluid was needed. By means of the very perfect and safe transfusion apparatus of M. Colin, of Paris, I slowly injected eight and a half ounces into the median basilic vein. The first effect which evidenced itself did so after about three ounces had been injected. Then the pulse became so rapid and weak that Dr. Mitchell, who kept it under his finger during the operation, could scarcely detect it. The patient declared that she felt as if her head would burst, and seemed greatly overcome. I went on slowly, however, transfusing the fluid until the amount mentioned had been reached; she was then left perfectly quiet.

In an hour from this time she had a decided rigor, the pulse was found beating between 150 and 160 to the minute, and the temperature rose to 104°. This high temperature, however, soon passed off, and toward midnight the patient fell into a quiet sleep, from which she did not awake until morning.

I saw her about 10 the next day, when Drs. Mitchell and

Jones gave me a very encouraging account of her. As I entered her room she said, in a feeble voice, "I feel that I am going to get well." This I was particularly glad to hear, as during the previous day she had given up all hope, and was utterly despondent. The pulse was beating at 116 to the minute; the temperature was 99¼°; the tendency to sweating had disappeared; and the facies had much improved.

During the day very small amounts of iced milk and lime-water were given by the mouth and retained. From this time onward it would be needless to mark the daily changes which occurred. The patient steadily progressed to complete recovery, and on the twenty-first day after the operation, upon a visit made by Dr. Jones, she walked down-stairs to meet him. The notes taken by him on this occasion declare that "the appetite is excellent, the patient growing stout, sleeping well, and gaining every day."

Six weeks after the operation the patient had so completely recovered that she very soon after returned to her home in Oswego.

The tumors were proved by the microscope to be adeno-carcinoma.

This case was published, and Dr. J. W. Howe was prompted to experiment in reference to the matter still further. Experimenting upon seven dogs, he withdrew from the veins a number of ounces of blood, and replaced it by intra-venous injection of milk. Every dog died promptly. He likewise tried the lacteal injection upon a man in the third stage of phthisis, in whom death from coma occurred in a few hours after the operation.

These results in no wise discouraged me in my pursuit of the subject, for I found that Dr. Howe had injected milk which had been drawn from the cow in a locality one or one and a half hour distant from New York, which place it had reached by rail after two and a half or three hours' lapse of time. This milk had, of course, undergone decomposition, and developed noxious properties. At my request, Dr. Eugene Dupuy repeated in his laboratory the same experiments upon dogs, and he established to his full satisfaction the following facts: 1. That the intra-venous injection of decomposed milk into dogs is uniformly fatal; 2. That the same experiment,

if practised with perfectly pure and fresh milk, is entirely innocuous.

Fortified by my own very fortunate experience, and by the experiments of Dr. Dupuy, I awaited the next case in which I should feel justified in repeating the procedure. This occurred on February 7, 1878, and is here given.

The patient, A. S., aged 22 years, married six months, native of Maryland, was admitted to the Woman's Hospital on account of a very large ovarian tumor which had been discovered nine months before. She was extremely exhausted, and the prognosis which was made as to her recovery from operation was very unfavorable. The removal of the tumor was rendered exceedingly difficult by numerous and firm adhesions, and in 24 hours acute peritonitis developed itself. After coming to the verge of death, the patient seemed to be recovering, when, on the fourteenth day after operation, a very large abscess discharged from the abdominal cavity a pint or more of pus. This exhausted her very much, and in three days from this time she was regarded as being moribund. From this point I base my statements upon the very careful bedside notes of Dr. Van Vorst, the house-surgeon of the hospital, who attended my patient with a devotion and zeal which I cordially acknowledge here.

February 27th, 8 P. M.—Pulse 152, hardly perceptible; temperature $103\frac{4}{5}°$; mental aberration marked; patient semi-comatose; aroused with some difficulty. Feeling confident that, unless prevented from so doing by some very decided effort, my patient must very soon die, I decided at once upon the injection of milk into the veins. With great difficulty I succeeded in obtaining a cow from the stable of a gentleman living a mile and a half away, and it was driven to the door of the pavilion in which the patient lay. While the cow was being milked into a clean, warm china pitcher covered with carbolized gauze, through which the milk was strained, I opened the median basilic vein of the right arm, and in less than a minute after the milk was furnished it had begun to flow very slowly into the patient's body.

The apparatus employed for injection was a glass funnel, having attached to it a piece of India-rubber tube with a very

small canula at its extremity. After and during operation, patient was sustained by hypodermic injections of brandy and aromatic spirits of ammonia. At 10 P. M. patient had a chill. At 11.30 P. M., pulse much improved in force, and diminished in frequency; temperature 100⅘°. At 9. A. M., on the 28th, Dr. Hunter, the assistant-surgeon of the hospital, calling upon me to report, I asked at what hour the patient had died, and was surprised to learn that on his morning visit she was talkative and stronger, and was found by him reading a letter from her husband.

The patient takes nourishment *per rem* and *per anum*, and stimulants subcutaneously (brandy and ammonia). The injection of milk had evidently renewed the patient's strength. Everything progressed favorably until March 1st, when the patient's vital forces were evidently again rapidly failing, and a second injection of milk was determined upon. So very much exhausted had she become that it was questioned by all who saw her whether the effort at lacteal injection would not destroy life. The median basilic of the left arm was exposed, and fifteen ounces of milk (received at the moment from a cow at the door) were slowly injected, or rather allowed to flow into the vein.

Before the milk was all injected, the pulse fell sixteen beats and became perceptibly stronger. At 11 A. M., patient complained of headache; at 12 patient became almost pulseless, and temperature went up to 103⅗°; but she rallied when restoratives were applied, chief among which were the subcutaneous injection of brandy and ammonia. March 2d, 7 A. M., pulse, 118; temperature, 98⅗°. General strength greatly improved. 7 P. M., temperature, 99°. 11 P. M., pulse, 125; temperature, 100°. March 3d, 7.30 A. M., pulse, 118; temperature, 100⅖°. Eyes sunken, tongue dry and brown, at times semi-comatose, very restless.

At this time I was called away from town, and left my patient with all confidence to Dr. James B. Hunter, who, at 12 M., injected into left cephalic vein six ounces of milk—at this time, the pulse was 160. 1 P. M., pulse cannot be accurately counted, but approximatively it was estimated at 190; temperature, 104°—had a chill. March 4th, 8 A. M., temperature,

102° ; pulse, 122. At 3 P. M., eight ounces of milk injected by Dr. Hunter. Patient evidently subsisting only upon intravenous injection of milk, and failing steadily. 6 P. M., temperature, 103⅘° ; pulse, 152.

March 5th, 6 A. M.—Pulse, 156 ; temperature, 102⅘°. Diarrhœa—wound evidently communicating with intestine. 11 A. M., eight ounces milk injected into right radial vein. After this patient did not rally, but died at 1 P. M.

At first view it may appear that the lacteal injections, in this case, were productive of less favorable results than were those employed in the first case related, because the first patient's life was saved by one injection, while that of the second was lost after five injections had been practised. This view is an entirely erroneous one. The second patient was seen constantly with me, by Drs. J. B. Hunter, H. F. Walker, C. S. Ward, S. B. Jones, the members of the House Staff of the hospital, and others, and no one of these doubted that death would have inevitably resulted in a very few hours had not life been prolonged by the influence of the nutritive intravenous injections. Take the detailed reports of any one of these occasions, as already given, and few will feel inclined to doubt this conclusion. On the first occasion the patient was surely moribund. The pulse, beating at 152 to the minute, could scarcely be felt at the wrist, the surface was cold and covered by a clammy sweat, the patient was semi-comatose, and when aroused was decidedly aberrant in intellect, the respiration was jerking and automatic, and the facies was unmistakably expressive of rapidly approaching dissolution. It must be remembered, likewise, that those who arrived at the conclusion that death was imminent in this case were men of large hospital experience, who are constantly dealing with cases of ovariotomy, and who would not likely have made any mistake in the matter. Not on one occasion only was this conclusion arrived at, but on four, for, as I have already stated, it was thought that on no one of the occasions on which the lacteal injection was practised would life have lasted more than a few hours, without its roborant effect.

Here we see a patient dying of a most aggravated form of disease, as the report of the *pst-mrtem* examination will

presently reveal, whose life was, to all appearances, prolonged for six days by five intra-venous injections of milk. That she would have recovered, had she not been affected by localized gangrene of the large intestine, a morbid state which was incurable, I do not doubt. With that condition existing, it is not to be wondered at that, in spite of four reprieves, death should have resulted in the end.

The necropsy was made by Dr. Maxwell, pathologist of the hospital, and, as it presents points of great interest, I present his notes of it in full:

"*Autopsy, March 5, 1878, at 6.30* P. M.—Died at 1 P. M. Emaciation marked. In the median line, about 1½ inch above the pubes, is a wound in the abdomen 1½ inch long, in the upper part of which a small mass of fæces is seen to protrude.

"The omentum pedicle and adjacent parts are firmly adherent to the edges of the wound, forming a small cavity filled with a thick yellow mixture of pus and fæces.

"At the upper part of the wound, where the fæces are seen, the finger can be passed toward the right into the intestine. The opening appears to involve a little more than the anterior half of the gut, and the mucous membrane is everted over its edges. After removing the pus, the pelvic tissues, in the right groin, are seen to be very black, soft, and putrid, but not œdematous. The tissue is in a similar condition at the fundus of the uterus, but is normal beyond two lines from the surface.

"In separating the adhesions a cavity is found in the left groin near the anterior superior spinous process of the ilium, which contains about two ounces of pus. Its walls are black and putrid.

"Separating the adhesions still further, no pus is found outside of the cavity of the wound, nor are the parts softened or putrid. Behind the omentum the intestines are not adherent or injected, nor is any fluid or pus found.

"The opening into the gut is found to be into the caput coli, at its junction with the ilium or small intestine. The appendix vermiformis is normal.

"Another opening is also found into the colon, about 12 inches above the anus, viz., near the junction of the descending colon and rectum. Here the gut is completely separated.

"All the parts around the wound were found firmly

adherent to the pedicle and the left broad ligament of the uterus.

"Uterus lies with the cervix strongly drawn toward the left groin—the os being 1 inch above Poupart's ligament, and at the junction of its inner and middle third. The fundus lies to the right of the wound. Vagina, entire and normal. Bladder empty—much contracted and softened, so that the finger readily passed through its tissue. Inner surface, very rough. Uterus and bladder removed. Uterus laid open; tissue, firm and white; thickness, normal; no congestion; no evidence of metritis. A single plug of fibrin was found in one of the uterine sinuses, near the fundus. On scraping the cut surface the blood appears distinctly whitish, as if purulent. Size normal, except slight elongation from traction on the pedicle; length, 3 inches. Ovary—right normal—left wanting. Bladder—small, with strongly marked rugæ, all of which are covered with a dark-brown gritty sabulous material, probably urates. Under these deposits the mucous membrane is distinctly congested and thickened, but the sub-mucous tissue is everywhere normal.

"Kidneys, both large and fatty. Tissue, firm and not congested. Capsules not adherent. Pelvis and calices contain large flakes of exfoliated epithelium.

"Scraping the cut surface gives a thin purulent-looking fluid. Ureters, both slightly enlarged.

"Spleen, firm and normal.

"Chest, not examined."

The next and last case which I present is of little value in illustration of the good effects of milk as a substitute for blood injected into the veins. It simply corroborates what has been already fully proved, the fact that milk injected into the circulation is innocuous. The patient was bleeding to death before and during the operation, and bled steadily after it. Losing a great deal more than was supplied to her by the lacteal injection, she died from the disproportionate loss.

The patient entered my service in the Woman's Hospital with a very large ovarian tumor. This I removed by ovariotomy, and, finding it adherent all over the anterior wall of the abdomen, I had to tear it from the peritoneal cavity, leaving bleeding surfaces, from which steady oozing occurred, which could not be checked. I closed the abdominal wound, prefer-

ring to take the chances of this oozing proving fatal than to expose the peritoneal cavity for a long time, and strive against a species of flow which I felt could not be controlled. In electing this course I may have been in error; but, having often gained success by it in times past, it was my choice on this occasion. In sixty-five hours it became evident that the patient was sinking from hæmorrhage; and, withdrawing the cork which closed a drainage-tube which had been left in the abdominal cavity, one pint of fluid blood escaped, and later in the day an equally large amount flowed out. A consultation was now held with Drs. Hunter and Walker, as to the propriety of opening the wound, and endeavoring to stanch the flow. Had we supposed it possible that this was occurring from distinct and isolated vessels, this course would have been at once adopted, but we felt that in this case it would effect no good, while it would assuredly destroy what slight chance of life remained to the patient. The only hope lay in sustaining the strength, and trusting to the hæmostatic powers of Nature.

Under these circumstances the median basilic vein was opened, and five ounces of fresh milk were injected within one minute after removal from the udder of the cow. No perceptible effect was produced, and in fourteen hours after it the patient sank and died.

An autopsy revealed the fact that hæmorrhage had steadily continued after the practice of intra-venous injection, one pint of blood being found in the peritoneal cavity, and the whole abraded anterior abdominal wall was found to have exuded this, as if by a bloody sweat.

Enumerating all the cases in which milk has been injected into the general circulation, in place of blood, twelve are now on record: 3 by Hodder; 2 by Howe; 7 by Thomas.

In one instance only did evil results manifest themselves (one of Howe's cases); and this should not be considered, since decomposed milk was employed, which, like decomposed blood in transfusion, would almost surely produce fatal consequences.

Basing my conclusions, then, upon experience, and in no degree whatever upon theory, I venture, in conclud-

ing this essay, to sum up the matter in the following propositions:

1. The injection of milk into the circulation in place of blood is a perfectly feasible, safe, and legitimate procedure, which enables us to avoid most of the difficulties and dangers of the latter operation.

2. In this procedure, none but milk removed from a healthy cow within a few minutes of the injection should be employed. Decomposed milk is poisonous, and should no more be used than decomposed blood.

3. A glass funnel, with a rubber tube attached to it, ending in a very small canula, is better, safer, and more attainable than a more elaborate apparatus, which is apt, in spite of all precautions, to admit air to the circulation.

4. The intra-venous injection of milk is infinitely easier than the transfusion of blood. Any one at all familiar with surgical operations may practice it without fear of great difficulty or of failure.

5. The injection of milk, like that of blood, is commonly followed by a chill, and rapid and marked rise of temperature; then all subsides, and great improvement shows itself in the patient's condition.

6. I would not limit lacteal injections to cases prostrated by hæmorrhage, but would employ it in disorders which greatly depreciate the blood, as Asiatic cholera, pernicious anæmia, typhoid fever, etc., and as a substitute for diseased blood in certain affections which immediately call for the free use of the lancet, as puerperal convulsions, etc.

7. Not more than eight ounces of milk should be injected at one operation.

8. In conclusion, I would suggest that, if milk answers, not as good, but nearly as good, a purpose as blood under these circumstances, its use will create a new era in this most interesting department of medicine. That it will answer such a purpose, I am convinced from lengthy consideration and some experience of the matter; and I would be false to my own convictions if I did not predict for "Intra-venous Lacteal Injection" a brilliant and useful future.

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